

IN THE CLAIMS

Claims 1-37 are presented below:

Claim 1. (Currently Amended) An apparatus disposed adjacent to a main transfer mechanism for processing a substrate one by one, comprising:

a heating process chamber in which a heating process is performed one by one for the substrate;

a load lock chamber, integrally connected to the heating process chamber in a predetermined direction, having an opening closable with a shutter allowing the substrate to be transferred between the main transfer mechanism and the load lock chamber, and controlling at least oxygen concentration and pressure;

a transferring arm, having a temperature adjusting portion adjusting a temperature of the substrate placed thereon, capable of moving between the heating process chamber and the load lock chamber, in the predetermined direction and transferring the substrate one by one between the heating process chamber and the load lock chamber, and transferring the substrate between the main transfer mechanism and the heating process chamber through the opening; and

a gate valve shielding the heating process chamber from the load lock chamber.

2. (Original) The apparatus as set forth in claim 1, further comprising:

a first exhausting portion vacuum exhausting the heating process chamber;

a second exhausting portion normally exhausting the heating process chamber; and

a selecting portion adaptively selecting the first exhausting portion or the second exhausting portion and causing the selected portion to operate.

3. (Original) The apparatus as set forth in claim 2,
wherein the first exhausting portion reduces an inner pressure of the heating process chamber to around 1330 Pa or less, and
wherein the second exhausting portion reduces the inner pressure of the heating process chamber to around 100000 Pa or less.

4. (Original) The apparatus as set forth in claim 1, further comprising:
a controller controlling the temperature of the heating process for the substrate in the heating process chamber.

5. (Original) The apparatus as set forth in claim 4,
wherein the controller is capable of controlling the temperature in the range from 100°C to 800°C.

6. (Original) The apparatus as set forth in claim 1, further comprising:
a supplier supplying an inert gas to the heating process chamber.

Claim 7. (Canceled.)

8. (Original) The apparatus as set forth in claim 1,
wherein the load lock chamber has:
an opening through which the substrate is transferred to/from the outside, and
a shutter allowing the opening to be opened and closed.

9. (Currently Amended) The apparatus as set forth in claim 1,
wherein the transferring arm has a waiting portion in the load lock chamber for
temporarily placing the substrate thereon when the heating process ~~for the substrate~~ is
performed one by one for the substrate in the heating process chamber in a changed
processing condition.

10. (Original) The apparatus as set forth in claim 1, further comprising:
a supplier supplying an active gas to the load lock chamber; and
a sprayer spraying the active gas to a front surface of the substrate in the load lock
chamber so as to reform the front surface of the substrate.

11. (Currently Amended) An apparatus being disposed adjacent to a main transfer
mechanism for processing a substrate one by one, comprising:
a heating process chamber in which a heating process is performed one by one for the
substrate;

a load lock chamber, integrally connected to the heating process chamber in a predetermined direction, having an opening closable with a shutter allowing the substrate to be transferred between the main transfer mechanism and the load lock chamber, and controlling at least oxygen concentration and pressure;

a transferring arm, having a temperature adjusting portion adjusting a temperature of the substrate thereon, capable of moving between the heating process chamber and the load lock chamber, ~~in the predetermined direction~~ and transferring the substrate one by one between the heating process chamber and the load lock chamber, and transferring the substrate between the main transfer mechanism and the heating process chamber through the opening, and performing a cooling process for the substrate; and

a gate valve shielding the heating process chamber from the load lock chamber.

Claim 12. (Canceled).

13. (Currently Amended) The apparatus as set forth in claim 11,
wherein the temperature of the heating process in the heating process chamber is in the range from 400°C to 450°C, whereas the temperature of the heating process in the transferring arm is in the range from ~~150°C~~ 15°C to ~~250°C~~ 25°C.

14. (Original) The apparatus as set forth in claim 11, further comprising:
a supplier supplying an active gas to the load lock chamber; and

a sprayer spraying the active gas to a front surface of the substrate in the load lock chamber so as to reform a front surface of the substrate.

Claims 15-21 (Canceled.)

Claim 22. (Original) A method processing a substrate, comprising the steps of

(a) raising a temperature of the substrate to the predetermined temperature at which a heating process is performed for the substrate and decreasing an oxygen concentration in an area of which the substrate is processed at a velocity in a range from around 6000ppm/second to 20000ppm/second; and

(b) performing the heating process for the substrate at the predetermined temperature in the area with a decreased oxygen concentration.

Claim 23. (Original) The substrate processing method as set forth in claim 22,

wherein the step (a) is performed by decreasing the oxygen concentration of the area in which the heating process is performed for the substrate at a velocity of around 10000ppm/second.

Claim 24. (Original) The method as set forth in claim 22,

wherein the step (a) is performed by reducing an inner pressure of the area while an inert gas, a reactive gas, or a liquid vaporous gas is being supplied to the area so as to decrease the oxygen concentration of the area.

Claim 25. (Original) The method as set forth in claim 22, wherein the step (a) includes the step of: increasing the oxygen concentration of the area.

Claim 26. (Previously Presented) An apparatus for processing a substrate, comprising:

a first processing block having at least a coating process unit coating a processing solution on the substrate;

a heating and cooling unit having a heating process chamber heating the substrate, a load lock chamber integrally connected to the heating process chamber in a predetermined direction and disposed between the heating process chamber and the first processing block and controlling at least oxygen concentration and pressure, and a gate valve shielding the heating process chamber from the load lock chamber; and

a main transfer mechanism for transferring the substrate between the first processing block and the heating and cooling unit;

wherein the load lock chamber has a transferring arm capable of moving in the predetermined direction and transferring the substrate between the heating process chamber and the load lock chamber and performing a cooling process for the substrate, an opening

allowing the substrate to be transferred between the transferring arm and the main transfer mechanism, and a shutter allowing the opening to be opened and closed.

Claim 27. (Previously Presented) The apparatus as set forth in claim 26, further comprising:

a second processing chamber disposed adjacent to the first processing chamber, having at least two heating and cooling processing units; and

wherein the main transfer mechanism is disposed between the two heating and cooling units, transferring the substrate between the heating process chamber and the load lock chamber, and transferring the substrate between the first processing block and the second processing block.

Claim 28. (Previously Presented) The apparatus as set forth in claim 26, wherein the heating process chamber comprising:

a first exhausting portion vacuum exhausting the heating process chamber;

a second exhausting portion normally exhausting the heating process chamber; and

a selecting portion adaptively selecting the first exhausting portion or the second exhausting portion and causing the selected-means to operate.

Claim 29. (Previously Presented) The apparatus as set forth in claim 28,

wherein the first exhausting portion reduces the inner pressure of the heating process chamber to around 1330 Pa or less, and

wherein the second exhausting portion reduces the inner pressure of the heating process chamber to around 100000 Pa or less.

Claim 30. (Previously Presented) The apparatus as set forth in claim 26, the heating and cooling unit comprising:

a controller controlling a temperature of the heating process for the substrate in the heating process chamber.

Claim 31. (Previously Presented) The apparatus as set forth in claim 30, wherein the controller is capable of controlling the temperature in the range from 100°C to 800°C.

Claim 32. (Previously Presented) The apparatus as set forth in claim 26, wherein the temperature of the heating process in the heating process chamber is in the range from 400°C to 450°C, whereas the temperature of the heating process in the transferring arm is in the range from 15°C to 25°C.

Claim 33. (Previously Presented) The apparatus as set forth in claim 26,

wherein the transferring arm has a waiting portion in the load lock chamber for temporarily placing the substrate thereon when the heating process for the substrate is performed in the heating process chamber in a changed processing condition.

Claim 34. (Previously Presented) The apparatus as set forth in claim 26, the heating and cooling unit comprising:

a supplier supplying an inert gas to the heating process chamber.

Claim 35. (Previously Presented) The apparatus as set forth in claim 26, the heating and cooling unit comprising:

a supplier supplying an active gas to the load lock chamber; and

a sprayer spraying the active gas to a front surface of the substrate in the load lock chamber so as to reform the front surface of the substrate.

Claim 36. (Previously Presented) The apparatus as set forth in claim 26, the heating and cooling unit comprising:

a supplier supplying an inert gas, a reactive gas, or a liquid vaporous substance to the process chamber; and

a pressure reducing portion reducing an inner pressure of the process chamber.

Appl. No. 09/986,894
Reply to Office Action of July 1, 2003

Claim 37. (Previously Presented) The apparatus as set forth in claim 26, the heating and cooling unit comprising:

a controller controlling the supplier and the pressure reducing portion so that the oxygen concentration of the process chamber decreases at a velocity in the range from around 6000ppm/second to 20000ppm/second.